


One-Year Results of an Educational Program on Osteoarthritis: A Prospective Randomized Controlled Trial in Brazil

Geriatric Orthopaedic Surgery
& Rehabilitation
2016, Vol. 7(2) 86-94
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DOI: 10.1177/2151458516645634
gos.sagepub.com


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Abstract

Introduction: Knee osteoarthritis (KOA) is the most prevalent form of osteoarthritis. Low socioeconomic level, age, and obesity are directly correlated with the incidence of the disease. Education, exercise, and diet are the core recommendations of all KOA treatment guidelines. **Objective:** To evaluate the impact of a multiprofessional educational program on patients with KOA. **Methods:** Of a total of 198 participants, 150 patients with KOA attended 2 days of lectures (at 1- to 3-month intervals) and received educational material on osteoarthritis, and a control group (48 patients) received educational materials only. Body mass index (BMI), frequency, and intensity of physical activity, pain, function, and quality-of-life scores were assessed at baseline and at 4 and 12 months after the educational program. Bimonthly telephone calls were made to half of the participants. Correlations between BMI, level of education, coping skills, functional, and pain results was procured. **Results:** The groups were similar in terms of race, gender, affected side, and osteoarthritis severity. The results were not affected by the telephone calls or the patients' level of education. At baseline, 25 performed physical activity, whereas 123 performed at 1 year. Seventy-two (36.36%) patients decreased BMI (45 by 1 point and 27 by more than 2 points). There were some weak correlations such as BMI reduction with pain and functional improvements and with coping results. Significant improvements in function and quality of life were found at 4 months. Quality of life remained improved at 1 year. **Conclusion:** The effect of this educational program in function and quality of life of patients with KOA is very subtle. Interval between classes (1, 2, or 3 months) is not an important issue.

Keywords

osteoarthritis, knee, education, quality of life, treatment outcome

Introduction

The most prevalent osteoarthritis (OA) localization is the knee joint, and symptomatic knee OA (KOA) affects 24% of the general population.¹ Low socioeconomic level, age, and obesity are directly correlated with the disease incidence.²⁻⁵

In 2010, the educational attainment of the Brazilian population aged 10 years or older included 50.2% with no education or incomplete primary education and 7.9% with a college degree.⁶ Longevity and obesity are increasing in Brazil.^{7,8} Low income, level of education, increased longevity, and obesity are major factors in an increased incidence of OA in Brazil.

International guidelines for the treatment of KOA suggest that the basic principles consist of the need for a combination of pharmacological and nonpharmacological treatments with a core set of initial measures, including information access/education, weight loss if overweight, and an appropriate exercise

program.^{9,10} There are several reports of minor effects of educational programs on pain, function, time spent in gyms, and weight loss.^{9,11,12} A positive outcome from a previous week-long educational program for patients with osteoporosis¹³ propelled the present proposal for 2 days of lectures and workshops about OA, reinforced by telephone calls, for patients with KOA. This study evaluates a multiprofessional conservative

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treatment for patients with KOA with 4 different educational program options with or without bimonthly telephone calls.

Methods

This study was performed at the Department of Orthopedics and Traumatology in a tertiary hospital in Brazil.

Design

The design of the study was a randomized controlled trial. This study followed the guidelines of the CONSORT statements for randomized controlled trials and nondrug treatments.¹⁴

Participants

The care providers were 7 orthopedic surgeons, 4 psychologists, 3 social workers, 1 nutritionist, 5 occupational therapists, 3 physical therapists, and 2 physical educators who were either volunteers or on staff at the Orthopedic Institute.

Patients had to meet the following criteria: an outpatient aged 45 years or older with KOA according to the American College of Rheumatology clinical and radiological definition¹⁵ who had received standard care for OA in the past 6 months; no other rheumatologic disease; knee pain rated above 30 mm on a numerical scale and necessitating drug treatment; and able to understand and agree with the informed consent. The exclusion criteria included participating in another program with nutritional education, engaging in another clinical trial, or undergoing surgery during the study not related to KOA that would prevent daily regular exercises.

Intervention

By November 2011, 306 patients were under routine care for KOA, that is, followed by orthopedic surgeons and undergoing blood tests for metabolic syndrome (and referred to a general practitioner for clinical control) and calcium metabolism, X-rays, densitometry, and more specific images (ultrasound and magnetic resonance imaging [MRI]) according to symptoms. All patients were prescribed diacerhein. Paracetamol and codeine were offered for pain. A muscle relaxant and magnesium were prescribed for cramps. Nonsteroidal anti-inflammatory drugs (NSAIDs) were used only occasionally for severe pain and for short periods of time. Vitamin D3 and calcium supplements were prescribed according to blood levels and bone densitometry results. When present, osteoporosis was treated with alendronate. Based on X-ray results, that is, classification of the severity by 3 orthopedic surgeons using the Kellgren and Lawrence (K&L) classification,^{16,17} orthotics, such as valgus or varus insoles, canes, walkers, and custom-made hand orthotics, were prescribed. Patients with impaired mobility and pain were referred to physical therapy and acupuncture. Of the 306 total patients, 228 met the inclusion criteria and were interested in participating in the study.

The medical team chose the Visual Analogue Scale (VAS), Western Ontario and McMaster Universities Osteoarthritis

Index (WOMAC [Brazilian version]), Lequesne index, and 36-Item Short-Form Health Survey (SF-36) questionnaires¹⁸⁻²⁰ for the assessment of pain, function, and quality of life at all time points. Patients were asked whether they performed physical activity with its frequency and intensity.²¹ The social work team asked patients to report how many years of school they had completed. The nutritionist collected anthropometric data and calculated the body mass index (BMI).

After baseline evaluations and questionnaires, participants were randomly allocated into 4 groups (1-4, according to the intervals of 1, 2, and 3 months between the 2 days of lectures, or no lectures in the case of group 4) and 2 subgroups (A and B, according to the use of bimonthly telephone calls or no telephone calls, respectively) of 28 or 29 participants. All groups received a booklet on OA and a video with all of the lectures. Group 4 was required to watch the video once at the hospital and only then received the take-home material. Patients in groups 1 to 3 were asked to come to the hospital on 2 specific Saturdays according to the intervals of each group.

The program, explained partially in our short-term results,¹⁷ comprised 2 days (from 7:00 to 17:00 hours, with meals included) of lectures and workshops on causes and treatment of OA. The first day comprised lectures by all teams of professionals and workshops with the physical and occupational therapists. Each professional team had a lecture of 30 to 40 minutes (orthopedic surgeons, psychology, physical therapy, occupational therapy, physical fitness, and social workers) or up to 80 minutes (nutritionist). The physical and occupational therapists also had a 60-minute workshop. The physicians introduced the anatomy of a joint and the pathology of OA, its causes, irreversibility, and management. The psychology team explained personality characteristics from childhood to adulthood, called attention to the difference between having and being a disease and being the results of your choices and not your conditions or feelings, and worked on coping skills. The physical therapists and the physical educators called attention to the importance of a regular exercise program and the differences between physical labor and such a program. While the physical therapists showed how to improve activity to move from pain to a state of no pain, physical fitness instructors focused on a variety of options of exercises to improve strength, resistance, and flexibility. The occupational therapists introduced the importance of protecting joints in daily activities through optimum ergonomic performance as well as by alternating different levels of energy expenditure. The nutritionist explained the importance of a well-balanced diet (reduced quantity, colorful, whole grains, eating every 3 hours, and low-calorie meals). The social work team showed where and how patients could and should include habits of regular leisure, sports and social gathering, and tasks. During the 2 workshops, the physical therapy team taught the patients the exercise series presented in the booklet and in the DVD, which was to be conducted at least 3 times a week. The occupational therapy workshop showed patients how to protect their joints during daily activities in a model house (bathroom, kitchen, bedroom, and workshop, particularly for men). The second

intervention program was the same length (from 7:00 to 17:00 hours) and started with the social workers. Patients were asked about accomplishments and difficulties in performing the suggested activities. The psychology team led a group session where patients shared their experiences with the program. The physical therapists repeated the workshop taught in the first intervention. The occupational therapy team asked the patients to participate in the planning of a week's activities with a goal of avoiding unnecessary heavy-duty tasks and alternating different levels of energy expenditure. The nutritionist reviewed the slide sequence shown in the first class and answered questions for each specific topic related to a well-balanced diet. The physical fitness team did a workshop on relaxation and meditation. The medical team closed the program by quizzing patients on the definition, causes and management of OA, and recalling highlights of each team's presentations. Both days of lectures had 30- to 60-minute intervals, at 9:30 (30 minutes), 13:00 (1 hour), and 16:00 (30 minutes), for meals composed of the diet suggested by the nutritionist.

The printed material contained summaries of all classes from the first intervention day, including the actual exercises performed at the physical therapists' and physical educators' workshops as well as practical recommendations for daily living offered by the occupational therapists. The DVD had the 3 workshops (physical therapy, fitness, and occupational therapy) and all 7 explanatory lectures given in the first intervention, lasting a total of 143 minutes. All patients were asked watch the DVD and/or read the booklet no less than 3 times.

Subgroup A patients received telephone calls from the medical team 2 months after the lecture and every other month after that until the 1-year reassessment. Patients were asked about pain, medications, diet, occupational therapy participation, and social and/or physical activity and frequency. Patients were reminded repeatedly to watch the DVD and/or read the material; to exercise at least 3 times a week (preferably daily); and to change their social, occupational, and dietary habits.

Patients were reevaluated 4 and 12 months after receiving the educational material. Patients answered the questionnaires, physical activity query, and, during the medical interview, the need to follow a healthy diet, exercise (if possible, continuously increase exercise load), and change occupational and leisure habits was reinforced. Evaluators were blinded to the allocation. Weight and height were measured at baseline and at 1 year after the educational program. The BMI was calculated. The psychology team evaluated the patients with a coping scale adapted to the Brazilian population²² at 1 year. The coping scale evaluated the patient's coping skills in terms of being focused on problems, their emotions and religion/fantasy thinking, and whether they were seeking social support. The Lequesne, WOMAC, VAS, and SF-36 scores and level of education were assessed at each visit according to group and telephone calls and to psychological coping results obtained at 1 year.

Sample size. This is a pilot study to evaluate the best (time wise) intervention to add multiprofessional education to

KOA clinical treatment. The authors aimed to have 30 patients in each group. Randomization was performed by a computer-generated program (available at <http://www.randomization.com/>).

Blinding. There was no difference in the information presented between groups. Groups 1, 2, and 3 had classroom instruction from all professionals as well as the audiovisual and written instructions that group 4 also received. When signing the informed consent, patients were aware that the groups would differ according to time between classes, lack of classes, and telephone calls. Evaluators did not know the group to which each patient belonged. Two secretaries scheduled appointments, classes, and material retrieval and plotted the questionnaires' results in Excel.

Statistical Analysis

Frequencies of nominal characteristics were described according to groups. The chi-square test was used for associations between groups. The Kruskal-Wallis test was applied for comparing OA severity, whereas the likelihood ratio was applied for race. Summary measures (quantitative characteristics) and analysis of variance (ANOVA), followed by Tukey's multiple comparisons, were used to compare groups.

The results of the coping questionnaire domains were described according to group and telephone calls. Comparisons were performed using ANOVA. For each group, the summary measures (mean, standard deviation, and 95% confidence interval [CI]) of the questionnaires' scores were described according to group and compared with ANOVA and Tukey's multiple comparisons. The SPSS version 17 program was used with a 5% level of significance.

Ethical Approval

The study was approved by the Ethics Committee for the Analysis of Research Projects (CAPPesq) under protocol number 0622/11. Clinical trials registration number: NCT01572051.

Results

A total of 306 patients were assessed for eligibility, and 246 met the inclusion criteria. Ultimately, 228 patients agreed to enroll (Figure 1). Four groups (2A, 2B, 3A, and 3B) were composed of 28 patients each; the other 4 groups (1A, 1B, 4A, and 4B) had 29 patients each. Sixteen patients missed classes (due to lost interest, weather conditions that prevented access to the hospital, or being unable to attend classes when they were scheduled). At this point, the subgroups ranged from 25 (1A and 2B) to 29 (1B and 4B) participants. At the 4-month reassessment, 1 patient had undergone total knee replacement and 2 patients had died (groups 1B and 4A). Five patients (group 2A = 1 patient, groups 4A and 4B = 2 patients each) missed the evaluation and, when called, decided not to continue in the study (either because they were not interested or lived too

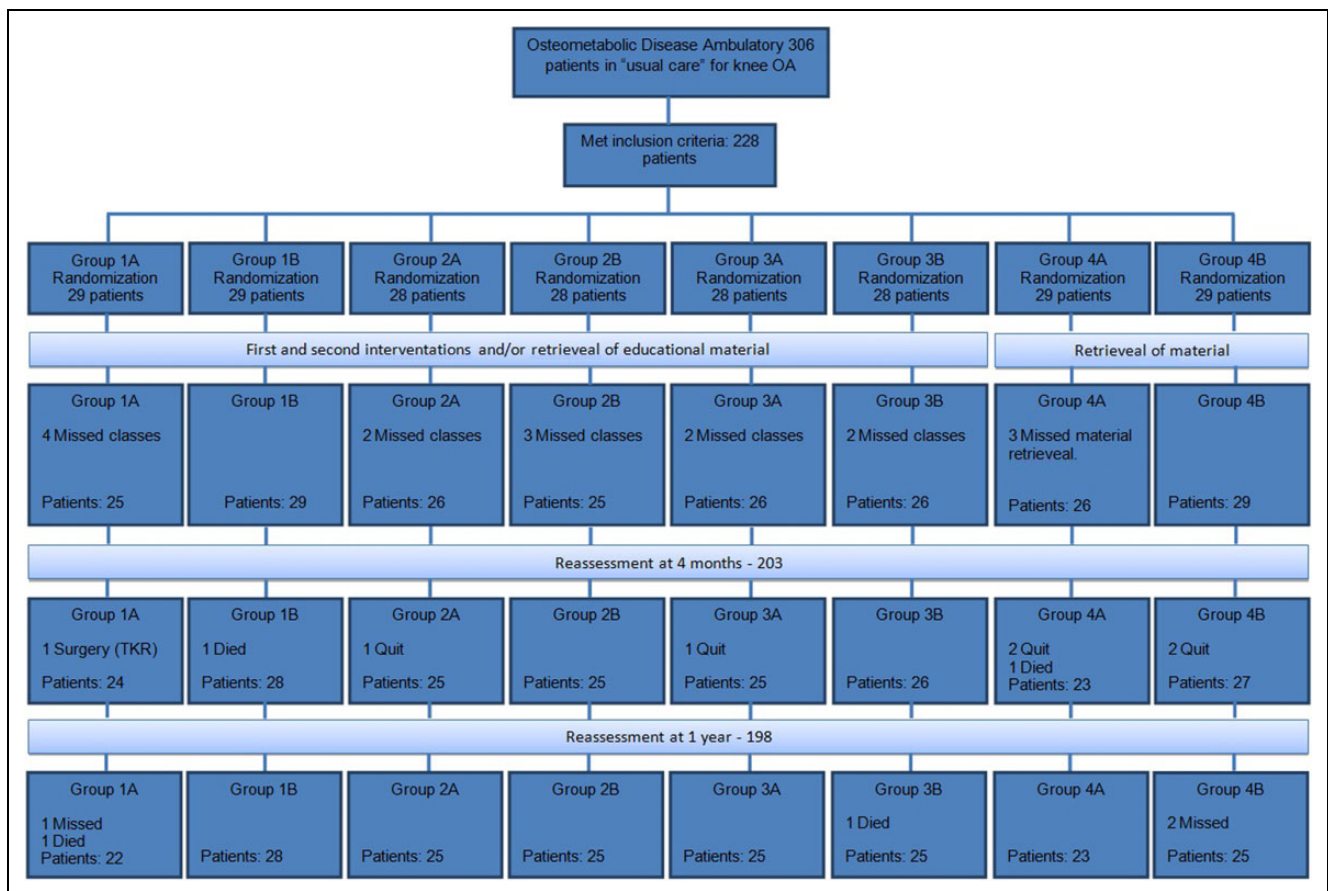


Figure 1. Flow of participants through the trial.

far away to attend follow-ups). At the 1-year reassessment, 2 patients had died (one from group 1A and another from group 3B). One patient from group 1A and 2 from group 4B missed the 1-year reassessment (Figure 1). Twenty-seven patients were lost, of whom eight were from group 4, seven from group 1, and six from groups 2 and 3.

All groups were homogeneous for nominal valued features, such as degree of KOA, gender, race, or affected side or bilaterality (Table 1). The groups were similar in age ($P = .121$) and level of education (.643). The average BMI differed significantly between groups ($P = .049$). Groups 1 and 4 had an average BMI of 31.3. The average BMI of group 2 was 32.8 and was significantly different from group 3 (average 29.8, $P = .026$, mean difference 3.01 ± 1.06 , 95% CI 0.25-5.76).

The number of patients who performed some physical activity was 25 at baseline (11 light; 12 moderate, and 2 vigorous) increasing to 123 (74 light, 40 moderate, and 9 vigorous activity) at 1 year.

In Tables 2 and 3, the summary measures of the scores obtained for the WOMAC, WOMAC pain, Lequesne index, VAS, and Mental (MCS) and Physical (PCS) domains of the SF-36 quality of life are presented. The analysis of these results with respect to group, telephone calls, level of education, BMI, and time of reassessment showed that the WOMAC, MCS, and PCS scores changed according to time

of reassessment ($P = .022$, $P = .012$, and $P = .038$, respectively; Table 4). Quality of life and functional improvements occurred primarily between baseline and the short-term reassessment at 4 months (PCS: -1.55 ± 0.58 , $P = .025$, 95% CI -2.97 to -0.14 ; MCS: -2.15 ± 0.79 , 95% CI -4.06 to -0.24 , $P = .021$; WOMAC (Table 5): $P = .023$, 95% CI 0.33-6.03, mean difference 3.18 ± 1.18) and lost significant growth at 1 year, except for MCS, for which the improvement was maintained after 1 year (mean difference -2.34 ± 0.93 , 95% CI -4.59 to -0.09 , $P = .039$). The WOMAC pain, VAS, and Lequesne scores had no significant differences among the factors evaluated ($P > .05$, Table 4).

Level of education had weak but significant correlations with Lequesne scores at 1 year ($r = -.162$, $P = .023$) and with PCS at baseline and at 1 year ($r = .206$, $P = .004$ and $r = .158$, $P = .026$, respectively). The VAS, WOMAC, WOMAC pain, and MCS and changes in VAS, WOMAC, WOMAC pain, PCS, and MCS did not correlate with education ($P > .05$).

Seventy-two patients lost weight (at least 1 point in BMI). Twenty-seven (of the 72) patients reduced more than 2 points in BMI. The remaining patients maintained (72 patients) or increased BMI (54 patients). We searched for correlations between BMI and all variables studied and found that baseline BMI correlated with BMI at 1 year ($r = .967$, $P = 0$). Changes in BMI correlated with the 1-year

Table 1. Descriptions of Personal and Clinical Characteristics of Patients According to Group and Results of Statistical Tests.^a

| Variables | Group | | | | | | | | P value |
|-----------------|-------------------------------------|------|--------------------------------------|------|--------------------------------------|------|------------------------------|------|-------------------|
| | 2 Days of lectures 1 month apart | | 2 Days of lectures 2 months apart | | 2 Days of lectures 3 months apart | | No classroom intervention | | |
| | n | % | n | % | n | % | n | % | |
| K&L right | | | | | | | | | .123 ^b |
| 0 | 0 | 0.0 | 0 | 0.0 | 2 | 4.0 | 0 | 0.0 | |
| 1 | 4 | 8.0 | 1 | 2.0 | 6 | 12.0 | 1 | 2.2 | |
| 2 | 20 | 40.0 | 17 | 34.0 | 13 | 26.0 | 13 | 28.9 | |
| 3 | 15 | 30.0 | 21 | 42.0 | 19 | 38.0 | 14 | 31.1 | |
| 4 | 11 | 22.0 | 11 | 22.0 | 10 | 20.0 | 17 | 37.8 | |
| K&L left | | | | | | | | | .426 ^b |
| 0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 3 | 6.2 | |
| 1 | 5 | 10.0 | 3 | 6.1 | 5 | 10.0 | 1 | 2.1 | |
| 2 | 21 | 42.0 | 14 | 28.6 | 15 | 30.0 | 15 | 31.2 | |
| 3 | 17 | 34.0 | 25 | 51.0 | 16 | 32.0 | 21 | 43.8 | |
| 4 | 7 | 14.0 | 7 | 14.3 | 14 | 28.0 | 8 | 16.7 | |
| Gender | | | | | | | | | .913 |
| Male | 13 | 26.0 | 10 | 20.0 | 12 | 24.0 | 11 | 22.9 | |
| Female | 37 | 74.0 | 40 | 80.0 | 38 | 76.0 | 37 | 77.1 | |
| Race | | | | | | | | | .602 ^c |
| White | 33 | 68.8 | 31 | 63.3 | 28 | 57.1 | 34 | 70.8 | |
| Mulatto/Mestizo | 9 | 18.8 | 11 | 22.4 | 12 | 24.5 | 8 | 16.7 | |
| Black | 5 | 10.4 | 5 | 10.2 | 9 | 18.4 | 4 | 8.3 | |
| Asian | 1 | 2.1 | 2 | 4.1 | 0 | 0.0 | 2 | 4.2 | |
| Knee | | | | | | | | | .757 |
| Right | 40 | 80.0 | 43 | 86.0 | 42 | 84.0 | 42 | 87.5 | |
| Left | 10 | 20.0 | 7 | 14.0 | 8 | 16.0 | 6 | 12.5 | |
| Bilateral | | | | | | | | | .880 |
| No | 15 | 30.0 | 14 | 28.0 | 17 | 34.0 | 13 | 27.1 | |
| Yes | 35 | 70.0 | 36 | 72.0 | 33 | 66.0 | 35 | 72.9 | |

Abbreviation: K&L, Kellgren and Lawrence.

^aResults by chi-square test.^bKruskal-Wallis test.^cLikelihood ratio test.**Table 2.** WOMAC, WOMAC Pain, Lequesne Index Scores According to Group, Telephone Calls, and Evaluation Periods.

| Group | Telephone calls | | WOMAC | | | WOMAC pain | | | Lequesne | | |
|--|-----------------|-----------|-------------|-------------|-------------|------------|-----------|-----------|------------|------------|------------|
| | | | Baseline | 4 Months | 1 Year | Baseline | 4 Months | 1 Year | Baseline | 4 Months | 1 Year |
| Group 1: 2 days of lectures 1 month apart | No | Mean (SD) | 48.8 (15.8) | 44.6 (13.5) | 44.3 (14) | 9.1 (4.3) | 8 (3.9) | 8.3 (3.6) | 11.9 (4) | 11.8 (3.4) | 12.4 (3.1) |
| | Yes | Mean (SD) | 44.3 (19.8) | 37.6 (17.2) | 40.2 (15.6) | 8.9 (4.2) | 7.8 (3.5) | 7.7 (3.4) | 11.3 (4) | 10.5 (3.6) | 10.9 (3.7) |
| Group 2: 2 days of lectures 2 months apart | No | Mean (SD) | 47.2 (19.3) | 41.5 (18.3) | 44.8 (20.4) | 9.9 (4.4) | 8.6 (4.2) | 8.5 (4.2) | 12.5 (4.3) | 11.7 (3.7) | 11.8 (4.7) |
| | Yes | Mean (SD) | 49 (17.2) | 44.8 (19.1) | 42 (19.5) | 9.6 (3.2) | 9 (4.4) | 7.7 (3.8) | 12.3 (3.4) | 12.8 (3.8) | 11.6 (4.8) |
| Group 3: 2 days of lectures 3 months apart | No | Mean (SD) | 43.8 (19) | 37.8 (13.2) | 42.6 (14.5) | 8.3 (4.3) | 7.8 (3.2) | 8.7 (3.2) | 11.2 (3.8) | 10.5 (3.9) | 12.1 (3.5) |
| | Yes | Mean (SD) | 43 (19.1) | 45 (19.6) | 44.9 (20.5) | 9 (3.9) | 8.7 (3.8) | 8.8 (4) | 11.8 (4.7) | 12.2 (4) | 11.9 (4.5) |
| Group 4: No classroom intervention | No | Mean (SD) | 43.2 (21.5) | 41.8 (18.1) | 45.6 (20) | 8.2 (4.1) | 8.5 (3.3) | 9.2 (3.7) | 12.6 (4.4) | 11.9 (4.2) | 12.4 (4.1) |
| | Yes | Mean (SD) | 44.4 (13.8) | 45.4 (18.9) | 47.5 (19) | 9.4 (4.1) | 8.9 (3.5) | 9.6 (4.7) | 11.9 (4.6) | 12.9 (4.7) | 12.2 (4) |

Abbreviations: SD, standard deviation; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

Table 3. Visual Analogue Scale (VAS) and SF-36 Quality of Life Scores According to Group, Telephone Calls, and Evaluation Periods.

| Group | Telephone Calls | | VAS | | | SF-36 PCS | | | SF-36 MCS | | |
|--|-----------------|-----------|-------------|-------------|-------------|------------|------------|-------------|-------------|-------------|-------------|
| | | | Baseline | 4 Months | 1 Year | Baseline | 4 Months | 1 Year | Baseline | 4 Months | 1 Year |
| Group 1: 2 days of lectures 1 month apart | No | Mean (SD) | 60.6 (24.8) | 58.5 (19.7) | 54.4 (23.2) | 32.6 (8.1) | 33.9 (7.5) | 34.2 (7.3) | 46.6 (14.1) | 46.9 (11.8) | 49.5 (10) |
| | Yes | Mean (SD) | 53.3 (25.2) | 48.8 (22.5) | 50.3 (22.1) | 32.7 (8.3) | 35.7 (6.9) | 31.7 (9.1) | 43.8 (12.3) | 47.2 (12.5) | 47.7 (13.1) |
| Group 2: 2 days of lectures 2 months apart | No | Mean (SD) | 60.8 (28.7) | 59.6 (25.2) | 52.7 (27.5) | 33 (9.1) | 34.6 (8.4) | 33.9 (9.6) | 43.5 (13.1) | 47.3 (10.4) | 47 (13.7) |
| | Yes | Mean (SD) | 67.8 (24.1) | 49.4 (26.2) | 53.4 (23.9) | 30.3 (6.5) | 33 (9.2) | 32 (8.4) | 44 (12.6) | 45.8 (12.3) | 45.8 (14.2) |
| Group 3: 2 days of lectures 3 months apart | No | Mean (SD) | 46.8 (28.3) | 46.3 (20.7) | 53.7 (24.1) | 34.7 (7.7) | 38 (8.8) | 36.1 (10.3) | 46.8 (9.9) | 47.4 (8.3) | 49.7 (10) |
| | Yes | Mean (SD) | 61.6 (24.7) | 61.1 (24.3) | 57.1 (21) | 31.6 (8.9) | 33.5 (9.1) | 32.6 (8.1) | 48.3 (11.4) | 50.4 (11.8) | 48.2 (11.4) |
| Group 4: No classroom intervention | No | Mean (SD) | 63.1 (29) | 61.2 (22.3) | 62.9 (21.5) | 33.7 (7.4) | 33.5 (8.8) | 34.3 (8.5) | 42.5 (13.7) | 45.2 (10.8) | 43.3 (13.7) |
| | Yes | Mean (SD) | 53 (25.8) | 60 (21.5) | 59.8 (26.7) | 33.6 (7.7) | 32.4 (8.5) | 32.7 (8.1) | 45.4 (12.1) | 47.9 (9.6) | 48.6 (17) |

Abbreviations: SD, standard deviation; SF-36, 36-Item Short-Form Health Survey; MCS, mental component summary; PCS, physical component summary.

results of the WOMAC ($r = -.172$, $P = .016$), WOMAC pain ($r = -.193$, $P = .007$), Lequesne ($r = -.197$, $P = .006$), and MCS ($r = .160$, $P = .027$) and with changes in WOMAC ($r = .220$, $P = .002$), WOMAC pain ($r = .199$, $P = .006$), and VAS ($r = .170$, $P = .018$).

The coping domains were similar between groups ($P > .05$) and were not influenced by telephone calls ($P > .05$). The MCS results were directly related to problem focusing (baseline, $r = .273$, $P = 0$; 4 months, $r = .170$, $P = .024$; and 1 year, $r = .200$, $P = .007$) and inversely related to emotion-focused scores (baseline, $r = -.306$, $P = 0$; 4 months, $r = -.279$, $P = 0$; and 1 year, $r = -.388$, $P = 0$). Similar weak but significant correlations were found between coping focused on religion/fantasy thinking and WOMAC, WOMAC pain, VAS, Lequesne, and PCS scores at all time points (baseline, 4 months, and 1 year). All but PCS were direct correlations.

Pain and quality-of-life changes were not correlated with coping domains. Patients who scored higher in problem focusing showed a direct correlation with improvement in the Lequesne score ($r = .148$, $P = .049$). There were no adverse events.

Discussion

All groups were similar in gender, race, age, affected side, and OA severity (Table 1). The BMI ranged from 29.8 (group 3) to 32.8 (group 2). Patients in group 3 were less obese than those in group 2 ($P = .026$). Patients were allowed to participate regardless of inability to walk without aid or severe chronic diseases as long as they were already in treatment with recommendations from their specialists as to restriction of fluids, medications, and exercise routine. This could be a reason for the 4

deaths during the follow-up period. Some studies have excluded these types of patients.¹²

Considering the variables studied, telephone calls did not significantly improve the results (Tables 2-4). The effect size (ES) of telephone calls in the improvement of pain was 0.12 (95% CI 0.0 to 0.24) and in the improvement of function was 0.07 (95% CI 0.00 to 0.15).¹³ Calling 110 patients every other month, with a time expenditure of between 10 and 30 minutes per patient, was time consuming and not as effective as when patients came to the hospital for a consultation, where measures could be taken to relieve pain and where patients were able to exchange experiences with other participants in the program while waiting for their consultation.^{23,24} The WOMAC, PCS, and MCS scores varied according to times of evaluation ($P = .022$, $P = .038$, and $P = .012$, respectively) regardless of group or telephone calls. In general, as expected, patients improved more at 4 months than at 1 year.¹⁵ The MCS improvement remained significant at 1 year ($P = .039$). The short-term improvements in pain and function favoring groups who attended classes¹⁷ were not significant at 1 year; from a cost perspective, this result favors the use of educational material only.¹¹ Education is described to have a very small effect on pain, with an ES of 0.06 (95% CI 0.03 to 0.10) and, on function, with an ES of 0.06 (95% CI 0.02 to 0.10)⁹; however, there can be no changing of habits, improving exercise or reducing BMI without teaching the importance, the benefits, and how and when to do it. Patients must perceive the disease as important and the change in habits as beneficial. Patients are more receptive to health information when it is presented in terms of potential gain and uses examples that are of the same gender and race.^{23,24} Years and grade of obesity, degree of OA, functional impairment, adversity coefficient, lack or presence of depression, and social-economic problems also influence

Table 4. Results of ANOVA for Comparison of Scores between Group, Telephone Calls, and Times of Reassessment.

| Variable | Source | df Num. | df Den. | F Value | P-Value |
|------------|--|---------|---------|---------|---------|
| WOMAC | Moment | 1.94 | 369 | 4 | .022* |
| | Moment \times Group | 5.83 | 369 | 1 | .248 |
| | Moment \times Calling | 1.94 | 369 | 1 | .474 |
| | Moment \times Group \times Calling | 5.83 | 369 | 1 | .611 |
| | Group | 3.00 | 190 | 0 | .890 |
| | Calling | 1.00 | 190 | 0 | .939 |
| | Group \times Calling | 3.00 | 190 | 1 | .549 |
| WOMAC pain | Moment | 1.90 | 362 | 3 | .066 |
| | Moment \times Group | 5.71 | 362 | 2 | .101 |
| | Moment \times Calling | 1.90 | 362 | 1 | .436 |
| | Moment \times Group \times Calling | 5.71 | 362 | 0 | .981 |
| | Group | 3.00 | 190 | 0 | .710 |
| | Calling | 1.00 | 190 | 0 | .749 |
| | Group \times Calling | 3.00 | 190 | 0 | .801 |
| Lequesne | Moment | 2.00 | 380 | 0 | .807 |
| | Moment \times Group | 6.00 | 380 | 1 | .620 |
| | Moment \times Calling | 2.00 | 380 | 2 | .107 |
| | Moment \times Group \times Calling | 6.00 | 380 | 1 | .745 |
| | Group | 3.00 | 190 | 1 | .568 |
| | Calling | 1.00 | 190 | 0 | .889 |
| | Group \times Calling | 3.00 | 190 | 1 | .583 |
| VAS | Moment | 1.97 | 374 | 1 | .236 |
| | Moment \times Group | 5.90 | 374 | 2 | .126 |
| | Moment \times Calling | 1.97 | 374 | 0 | .766 |
| | Moment \times Group \times Calling | 5.90 | 374 | 2 | .139 |
| | Group | 3.00 | 190 | 1 | .399 |
| | Calling | 1.00 | 190 | 0 | .876 |
| | Group \times Calling | 3.00 | 190 | 2 | .084 |
| SF-36 PCS | Moment | 2.00 | 380 | 3 | .038* |
| | Moment \times Group | 6.00 | 380 | 1 | .527 |
| | Moment \times Calling | 2.00 | 380 | 0 | .618 |
| | Moment \times Group \times Calling | 6.00 | 380 | 1 | .773 |
| | Group | 3.00 | 190 | 0 | .684 |
| | Calling | 1.00 | 190 | 3 | .078 |
| | Group \times Calling | 3.00 | 190 | 1 | .605 |
| SF-36 MCS | Moment | 2.00 | 380 | 5 | .012* |
| | Moment \times Group | 6.00 | 380 | 0 | .969 |
| | Moment \times Calling | 2.00 | 380 | 0 | .864 |
| | Moment \times Group \times Calling | 6.00 | 380 | 1 | .757 |
| | Group | 3.00 | 190 | 1 | .409 |
| | Calling | 1.00 | 190 | 0 | .660 |
| | Group \times Calling | 3.00 | 190 | 1 | .601 |

Abbreviations: VAS, Visual Analogue Scale; ANOVA, analysis of variance; MCS, mental component summary; PCS, physical component summary; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index; SF-36, 36-Item Short-Form Health Survey.

* $p < 0.05$.

Table 5. Results of Multiple Comparisons Between WOMAC, Physical and Mental SF-36 Quality of Life Score, and Times of Reassessment.^a

| Variable | Comparisons | Mean Difference | SE | P-Value |
|-----------|-------------------|-----------------|------|---------|
| WOMAC | Baseline 4 months | 3.18 | 1.18 | .023* |
| | Baseline 1 year | 1.50 | 1.24 | .686 |
| | 4 months 1 year | -1.68 | 0.97 | .254 |
| SF-36 PCS | Baseline 4 months | -1.55 | 0.58 | .025* |
| | Baseline 1 year | -0.68 | 0.66 | .920 |
| | 4 months 1 year | 0.88 | 0.57 | .376 |
| SF-36 MCS | Baseline 4 months | -2.15 | 0.79 | .021* |
| | Baseline 1 year | -2.34 | 0.93 | .039* |
| | 4 months 1 year | -0.19 | 0.87 | >.999 |

Abbreviations: MCS, mental component summary; PCS, physical component summary; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index; SF-36, 36-Item Short-Form Health Survey.

^a Results by Tukey's multiple comparisons.

* $p < 0.05$.

activity of which 74 light, 40 moderate, and 9 performed vigorous regular activity. These results were not shown as improved scores in WOMAC, Lequesne, or PCS of the SF-36. Seventy-two patients lost weight, but only 27 more than 2 points in BMI affecting somewhat the correlation between BMI and pain/functional scores.

In the search for factors affecting compliance to the program, we found weak correlations between coping domains and questionnaire results. We did not find relation between the patients' level of education and pain and functional improvements. There was some indication that BMI reduction correlated with 1-year results of pain, function, and quality of life and with improvements in function (WOMAC) and quality of life, as expected,²⁵ mainly because, of the 198, only 27 reduced more than 2 points in BMI. Therefore, instead of offering educational material only, it might be better to intervene more frequently, allowing patients to exchange experiences with other participants and reinforce correct diet and exercise to maintain or even improve on the results obtained at 4 months.

The limitations of the study are (1) lack of control over the use of analgesics or other nonpharmacological measure. The educational program should be the core measure to all other types of OA treatment.¹⁰ Although educational programs are known to have a small ES,⁹ in our experience, teaching patients with osteoporosis led to a high adherence to physical activity, medications, and diet after the educational program.¹³ Therefore, all patients were already instructed to pursue physical activity, acupuncture, physical therapy, and orthotics before the educational interventions. Anti-inflammatory drugs were prescribed only for periods of no longer than a week, if they were prescribed at all. At the assessments, medications were seldom changed, but the actual consumption of medications was not evaluated in this study. (2) Patients with K&L grade IV were included. Despite being equally distributed across all groups, their greater physical limitations could have compromised the results. (3) The difference in BMI between groups 2 and 3 could be a potential bias; however, both groups were very

results. Patients who were essentially problem focused showed a weak relation to function improvement (Lequesne, $P = .05$) at 1 year.

Objectively, from the program, almost 100 patients changed from null to some physical activity. At baseline, only 25 practiced regular physical activity (11 light, 12 moderate, and 2 vigorous) and at 1 year 123 were practicing some physical

similar in BMI changes during the study and showed no significant differences in changes in pain, function, and quality of life. (4) We did not analyze changes in hours of physical activity, percentage of body fat, or quality of food ingested before and after the program. These are future aims for the 2-year reassessment. (5) We did not consider previous studies to estimate the sample size. We had no experience with our population, their level of education, or their capacity to answer questionnaires, so we decided to perform this prospective randomized study as a pilot study to identify the best approach to improve pain, function, and quality of life in our patients with KOA. All groups showed some small improvement regardless of classes or telephone calls. They did have difficulties answering questionnaires,²⁶ but the interval between classes did not influence the results at 4 or 12 months. Despite studies indicating that telephone calls improve results in the treatment of KOA and hip OA,^{9,25} in our experience, this was time consuming and not effective at the 1-year follow-up.

In our short-term results, we observed a superiority of results in patients who attended classes compared to those who only received the educational material.¹⁷ At 1 year, we could observe increased frequency and intensity of physical activity not translated effectively in improved pain and functional subjective scores. Roughly, 12% (27 of 228 initial patients) reduced more than 2 points in BMI and increased physical activity to levels of improved pain, function, and quality of life. Coping skills and educational level of patients may affect adherence to treatment, and we may need to adapt the program improve patient's adherence. To adapt the program to improve patients adherence.

Conclusion

The effect of this educational program in function and quality of life of patients with KOA is subtle. Interval between classes (1, 2, or 3 months) is not an important issue. The study did point directions that may lead to better results in future studies.

Authors' Note

Clinical trials registration: NCT01572051.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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